

Integrating STEAM and English with Oral Language Routines

Integrating the study of STEAM subjects and the English language is a powerful way to enhance student learning in both areas. Would you like to build your skills in supporting your students' development of the language skills they need to become active participants in the world of science, technology, engineering, arts, and math?

In this webinar, the presenter will:

- introduce several oral language routines that can help students at any age or level learn to communicate effectively about technical, mathematical, and scientific ideas
- explore how to adapt these routines to suit participant needs and to help students transfer skills across contexts



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Amanda Fox




Amanda is an education professional with a specialization in integrating second language learning with content area instruction, particularly in the areas of STEAM, project-based learning, and mathematics.

She began her career as an English language instructor in France and Brazil. After earning a MA in TESOL from the Middlebury Institute of International Studies, she taught at the University of California-Berkeley, the College of Marin, and the English Center of Oakland. She worked for ten years at Ecole Bilingue de Berkeley, serving as an ESL Specialist, Curriculum Coordinator, and STEAM Coordinator. She is currently the Math Curriculum Specialist at Presidio Knolls School San Francisco, California.



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Integrating STEAM and English with Oral Language Routines



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Integrating STEAM and English with Oral Language Routines

1. Warm-up: What's the Same? What's Different
2. STEAM, Subject Integration, & 21st Century Skills
3. Revisiting What's the Same? What's Different?
 - STEAM Integration: Vocabulary
4. Vehicle Chat
 - STEAM Integration: STEAM Language Skills
5. Which One Doesn't Belong?
 - 21st Century Skills and Language Learning

Teaching English



Teaching Math & STEAM



- English → STEAM: Learning is about **communication**
- STEAM → English: Communicating effectively requires **working systematically**
- STEAM & English: Thinking & communicating systematically

What's the same? What's different?



**Grayscale
thinking:**
*the ability to see
the in between:
answers are not
only RIGHT or
WRONG*

Let's hear from you! What's the same? What's different?

Why STEAM?

Science Technology Engineering Art Math

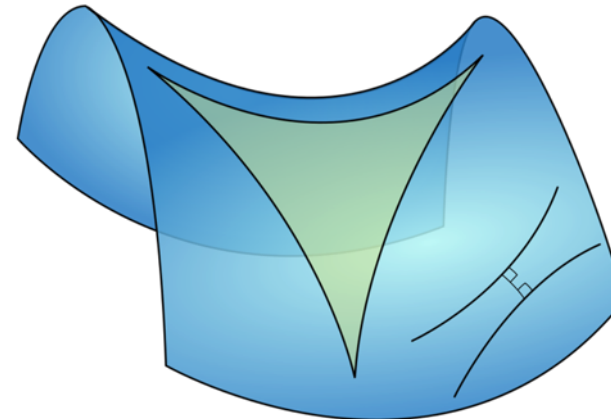
“Integrated curriculum can lead to deeper learning. ‘Deep learning’ means the shift from surface learning and covering content to understanding a topic in depth with the student taking the lead in his or her learning.”

Fullan, M. (2013). Stratosphere. Toronto, ON: Pearson.

Why Integrate Subjects?



Crochet:
Needlecraft that uses looping yarn to create different forms



Hyperbolic Plane:
A surface where space curves away from itself at every point.

Why Integrate Subjects?



Let's hear from you! What experiences have you had (as a teacher or a student) with integrated learning?

Why STEAM?

21st Century Skills

- Creativity & Innovation
- Critical Thinking & Problem Solving
- Communication & Collaboration

21st Century Skills: Learning for Life in Our Times

Bernie Trilling & Charles Fadel

21st Century Skills & Language Learning

21st Century Skills

- Creativity & Innovation
- Critical Thinking & Problem Solving
- Communication & Collaboration

Language Learning

- Use STEAM topics and thinking to focus on specific vocabulary
- Build STEAM language skills through structured activities (hypothesizing, defining, sorting & categorizing, justifying)
- Apply 21st century skills to the study of language

What's the same? What's different?



Let's hear from you! What's the same? What's different?

21st Century Skills & Language Learning

What's the Same? What's Different?

21st Century Skills

- Creativity & Innovation
- Critical Thinking & Problem Solving
- Communication & Collaboration



Language Learning

- Use STEAM topics and thinking to focus on specific vocabulary



21st Century Skills & Language Learning

What's the Same? What's Different?

Use STEAM topics and thinking to focus on specific vocabulary



Core Vocabulary:

Celery

Carrots

Tomatoes

Peppers

Squash

Eggplant

Pineapple

Practice core vocabulary using the routine.

Let supplemental vocabulary emerge from student thinking.

Let's hear from you! What supplemental vocabulary might students discover through this routine?

21st Century Skills & Language Learning

What's the Same? What's Different?

Use STEAM topics and thinking to focus on specific vocabulary



Supplemental Vocabulary:

Seeds Peel Stem Leaves
Round Long Fuzzy Smooth

**“Memory is the
residue of thought.”**

-Daniel T. Willingham

**Grammar Focus: to have, to be
(affirmative and negative)**

Peppers have seeds. Carrots don't have seeds.
Carrots are long. Peppers are not round.

21st Century Skills & Language Learning

What's the Same? What's Different? In Your Classroom

Use STEAM topics and thinking to focus on specific vocabulary

Facilitating Transfer



Choosing materials

Photos, drawings, physical objects, students posing

Adapting to different levels

For advanced students:

- Focus on more complex grammatical structures and vocabulary.
- Consider using graphs and data for a rich discussion.

21st Century Skills & Language Learning

What's the Same? What's Different? In Your Classroom

Let's hear from you! What ideas do you have for building vocabulary with What's the Same? What's Different?

21st Century Skills & Language Learning

Vehicle Chat

21st Century Skills

- Creativity & Innovation
- Critical Thinking & Problem Solving
- Communication & Collaboration

Language Learning

- Use STEAM topics and thinking to focus on specific vocabulary
- Build STEAM language skills through structured activities (defining, sorting & categorizing, justifying)
- Apply 21st century skills to the study of language

Is a garbage truck a vehicle?



Is a tricycle a vehicle?



Is an elevator a vehicle?



Let's hear from you! Is an elevator a vehicle? Respond in the chat:
An elevator IS or IS NOT a vehicle because...

Is a salad a vehicle?



Let's hear from you! Is a salad a vehicle? Respond in the chat:
A salad IS or IS NOT a vehicle because...

What is a vehicle?



Reflection: write a definition. Be as clear and precise as you can.
Did your definition change as you saw the pictures?

21st Century Skills & Language Learning

Vehicle Chat

21st Century Skills

- Creativity & Innovation
- Critical Thinking & Problem Solving
- Communication & Collaboration

Language Learning

- Build STEAM language skills through structured activities
 - **Defining**
 - **Sorting & Categorizing**
 - **Justifying**

21st Century Skills & Language Learning

Vehicle Chat: STEAM Language skills

Defining

A vehicle is a machine that is powered by a motor and moves things or people from one place to another.

Sorting & Categorizing

All vehicles have motors, and if it does not have a motor, then it is not a vehicle.

Justifying

An elevator is not a vehicle because it can only move on a set track.

21st Century Skills & Language Learning

Extending Vehicle Chat: STEAM Language skills

Is it a...

Use drawings, pictures, or physical objects to spark a discussion!

Defining

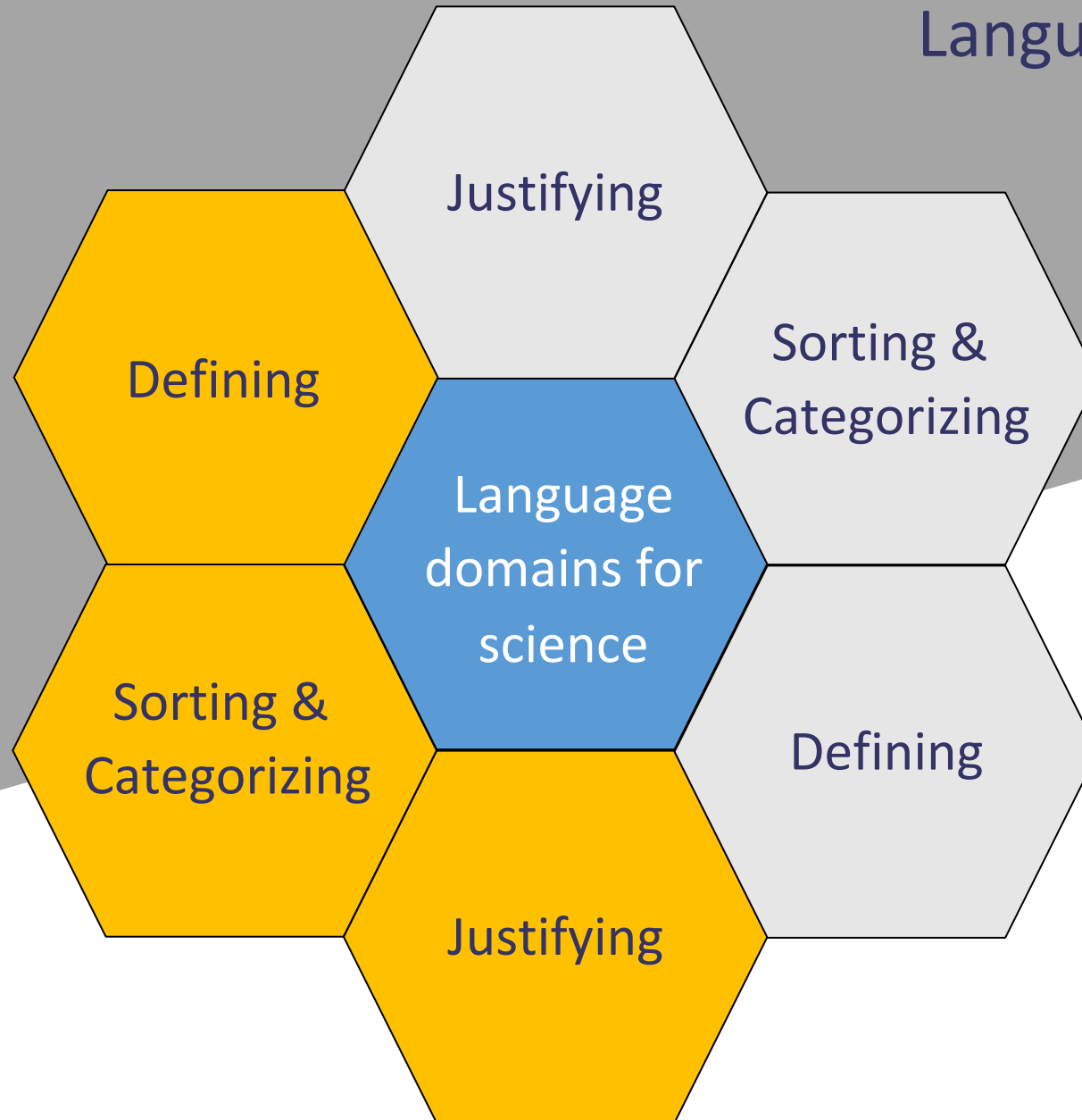
Sorting & Categorizing

Justifying

Let's hear from you! What other topics could your students debate to engage in these STEAM language skills?

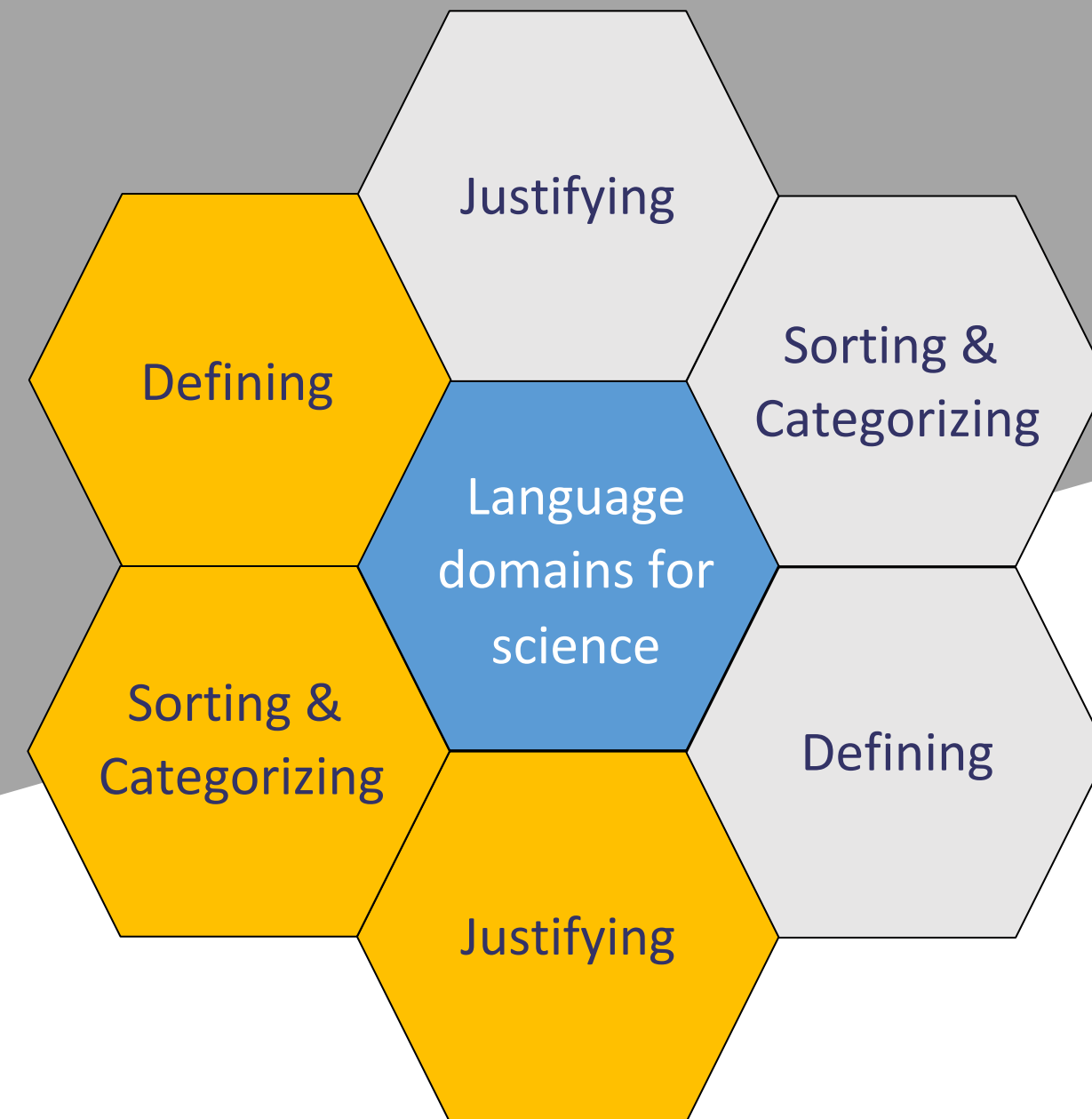
Oral
Language

Written
Language



Primary
Language

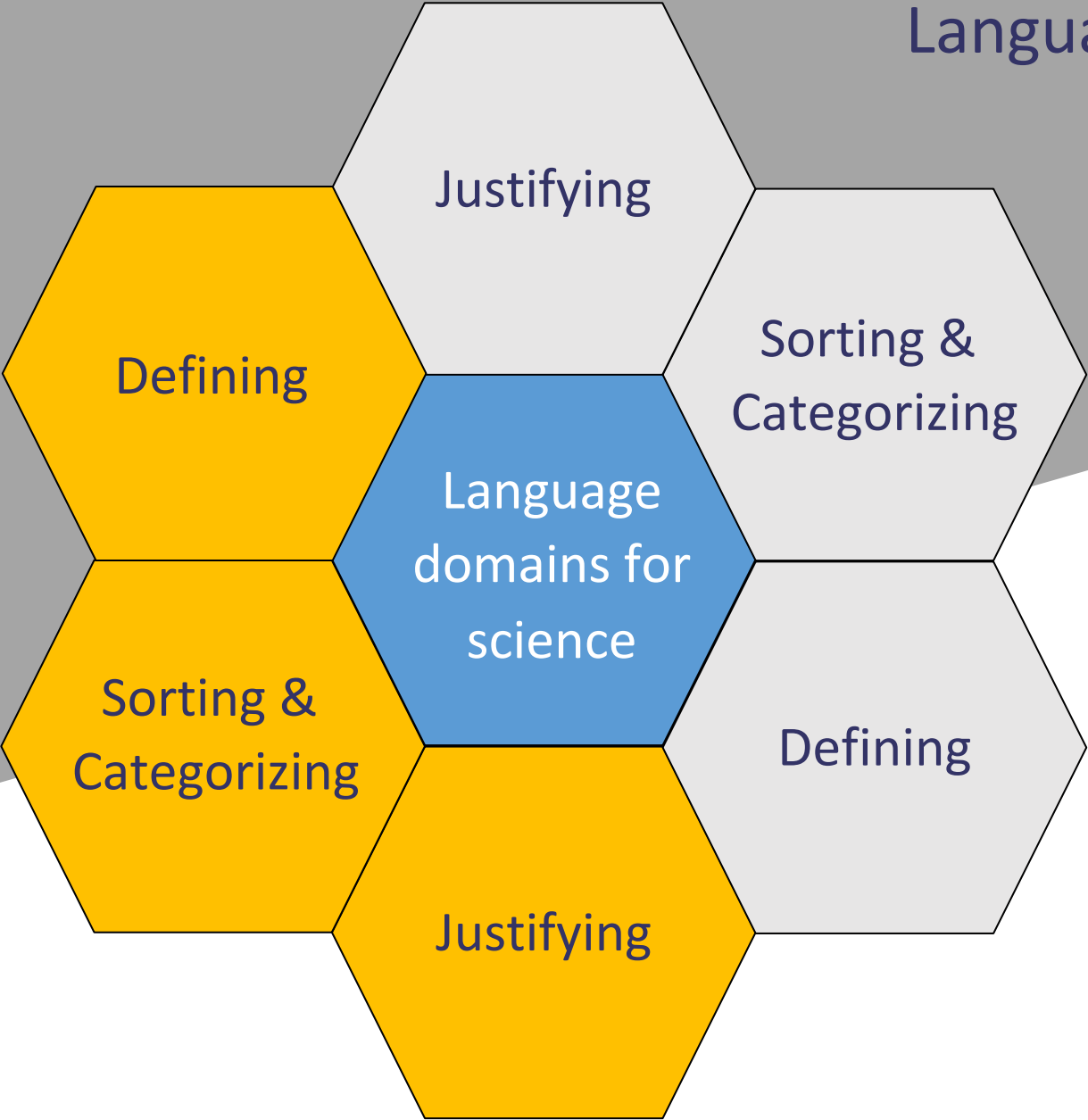
English



Language of
Daily Life

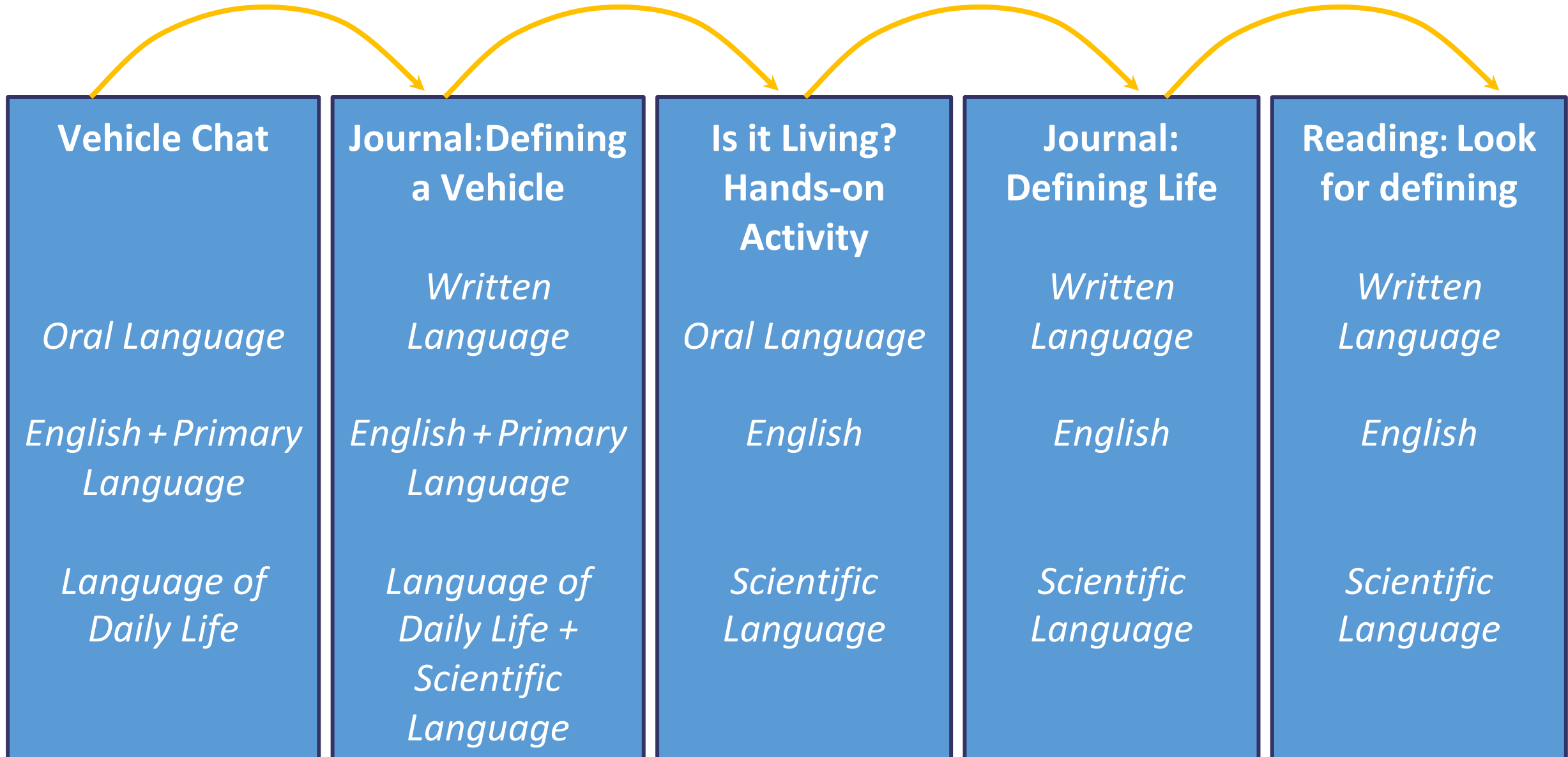


Scientific
Language



A Flexible Lesson Design to Facilitate Transfer

Guiding Question: How and why do scientists define and categorize?



21st Century Skills & Language Learning

Which One Doesn't Belong?

21st Century Skills

- Creativity & Innovation
- Critical Thinking & Problem Solving
- Communication & Collaboration

Language Learning

- Apply 21st century skills to the study of language

Which One Doesn't Belong?

Teacher role:

- Invite students to share ideas orally.
- Encourage using primary language and gestures to express ideas.
- Let vocabulary emerge from student thinking. Record vocabulary as it comes up.
- Use sentence stems if appropriate for your students.

1



2



3



4



Let's hear from you! Which one doesn't belong, and why? Respond in the chat:
___ doesn't belong because....

21st Century Skills & Language Learning

Which One Doesn't Belong?

- *Apply 21st century skills to the study of language*



Creativity & Innovation ★ Critical Thinking & Problem Solving ★ Communication & Collaboration

Defining ★ Sorting & Categorizing ★ Justifying

21st Century Skills & Language Learning

Which One Doesn't Belong?

- *Apply 21st century skills to the study of language*

1

I enjoy baking.

I love chocolate.

2

3

The baking cookies
smell delicious.

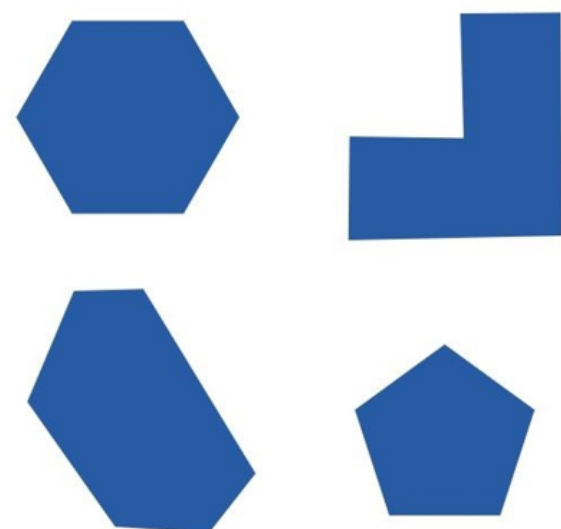
I love to bake.

4

Let's hear from you! Which one doesn't belong, and why? Respond in the chat:
___ doesn't belong because....

21st Century Skills & Language Learning

Which One Doesn't Belong?



Attributes of shapes:

- Number of sides and angles
- Symmetry
- Parallel lines
- Congruence of sides

I enjoy baking.	I love chocolate.
The baking cookies smell delicious.	I love to bake.

Attributes of language:

- Spelling and sounds
- Parts of speech
- Sentence structure
- Verb tense
- Connotation and denotation of words

21st Century Skills & Language Learning

Which One Doesn't Belong? in your classroom

- Choose four pictures, drawings, numbers, objects, words, or sentences as a prompt.
- You can choose your prompts to focus on language:
 - Pictures to practice specific vocabulary
 - Words or sentences to introduce a new topic or review a known topic in grammar
- You can choose your prompts to focus more generally on STEAM Skills:
 - High interest pictures or physical objects
 - Have students make their own

Let's hear from you! What ideas do you have for using Which One Doesn't Belong in your classroom?

21st Century Skills & Language Learning

21st Century Skills

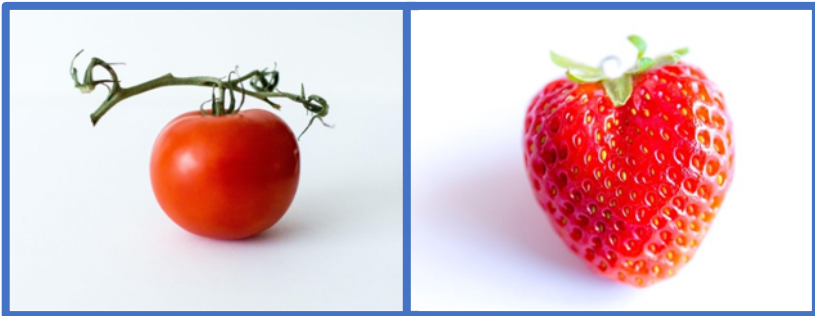
- Creativity & Innovation
- Critical Thinking & Problem Solving
- Communication & Collaboration

Language Learning

- Use STEAM topics and thinking to focus on specific vocabulary
- Build STEAM language skills through structured activities (hypothesizing, defining, sorting & categorizing, justifying)
- Apply 21st century skills to the study of language

STEAM is a way of thinking.

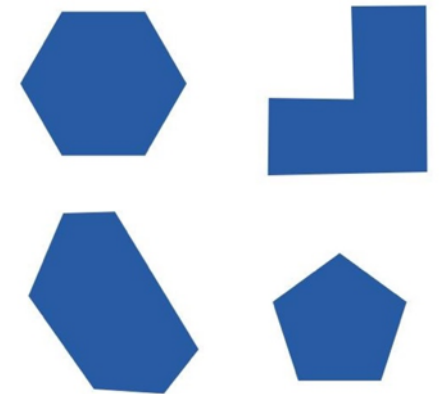
Primary Language	↔	English
Oral Language	↔	Written Language
Language of Daily Life	↔	Technical Language
21st Century Skills	↔	Language Learning



What's the same? What's different?



Vehicle Chat



Which One Doesn't Belong?

Let's hear from you! What is one idea you will take away from today?

The background of the slide is a light cream color, decorated with several sharpened colored pencils in various colors (red, yellow, green, blue, purple) scattered around the edges, pointing towards the center.

Thank you!

Christopher Danielson, Vehicle Chat & Which One Doesn't Belong

Sue Looney, Same But Different Math

My colleagues from Presidio Knolls School

The OPEN Network

All of the participants for being here today!

Check the resources page for links to learn more about the oral language routines!

References

Fullan, M. (2013). Stratosphere. Toronto, ON: Pearson.

Trilling, Bernie. (2009). 21st century skills: Learning for life in our times. San Francisco: Jossey-Bass.

Willingham, Daniel (2008). [What Will Improve a Student's Memory?](#) *American Educator* Winter 2008 - 2009, 17-44.

Science images: <https://unsplash.com/photos/2LJ4rqK2qfU>, <https://unsplash.com/photos/iar-afB0QQw>,
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Crochet image: <https://unsplash.com/photos/JMozJjny8WU>

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Fruits & vegetables: <https://unsplash.com/photos/-gOUx23DNks>

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Same/Different: <https://unsplash.com/photos/d2aZ2MJBSeU>, <https://unsplash.com/photos/DYbr5utVs8s>

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Thank you!

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Reflection Questions

1. How would your students respond to the “Which doesn’t belong?” and the “Is it a vehicle?” classification activities? How might you adapt the content to suit your curriculum or students’ interests?
2. Even if you don’t teach a STEAM content class, what is one thing you learned during today’s session that might enable you to meet your learning objectives while also building 21st-century skills?
3. How might you analyze your current curriculum or existing lesson plans to find opportunities to incorporate STEAM topics, skills, or activities?



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